

Empirical Optimization of Additive Manufacturing, Phase I

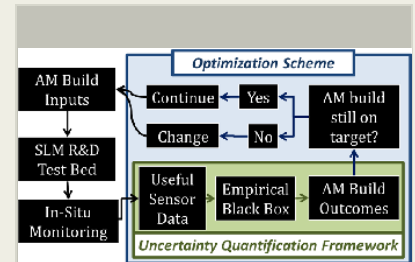
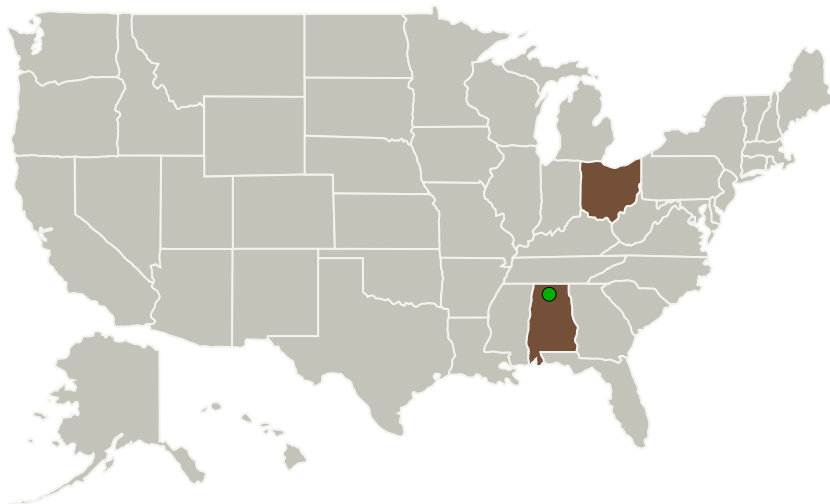
Completed Technology Project (2016 - 2017)



Project Introduction

In this Phase I STTR project, pursuant to the Materials Genome Initiative (MGI) and Integrated Computational Materials Engineering (ICME) interests, the proposed collaborative effort between WSU and Advratech will represent the first AM optimization framework of its kind, constructed entirely from experimental sensor data collected in-situ. Rather than using in-process data to inform limited "physics-based" FE models or detect single defects long after a build is complete, this framework will leverage correlations between in-situ data, input process parameters, and output AM build characteristics to construct a "physics-capturing" empirical black box that can be used to quantify AM process uncertainty, analyze sensitivities of AM component outputs to both input process parameters and in-process information, and ultimately, to optimize each layer of SLM builds in real-time. In essence, this project will provide a wrap-around software package and optimization tool that combines each mode of in-process data to inform real-time process parameter selection based on one or more desired physical property outputs. It will be designed on our SLM R&D test bed, be seamlessly applicable to any SLM system (e.g., Concept Laser LaserCUSING, etc.), and more generally applicable to any AM system (e.g., NASA's EBF3) used to construct aerospace components.

Primary U.S. Work Locations and Key Partners



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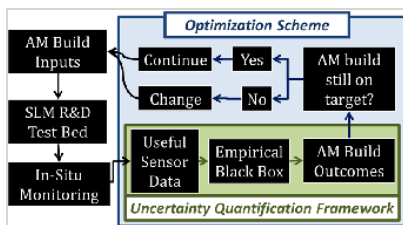
Organizations Performing Work	Role	Type	Location
Universal Technology Corporation	Lead Organization	Industry	Dayton, Ohio
Advratech LLC	Supporting Organization	Industry	Dayton, Ohio
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
Wright State University-Main Campus	Supporting Organization	Academia	Dayton, Ohio

Primary U.S. Work Locations

Alabama

Ohio

Images



Briefing Chart Image

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<https://techport.nasa.gov/image/129509>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Universal Technology Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

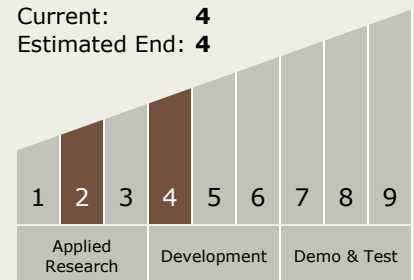
Joy Gockel

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes